

Request for Research Proposal

RFRP-17/18-985-01 - Underwater Noise Level Study During Impact Pile Driving // 442745-1-C2-01

This request is open to Florida universities with an executed Master University Agreement on file with the Florida Department of Transportation.

The Office of Environmental Management requests written proposals to provide research services for a Underwater Noise Level Study During Impact Pile Driving.

Details of the Services are described in Exhibit "A", Scope of Services, attached hereto.

The basis form of Agreement shall be a task work order issued under the Master University Agreement by the Office of Environmental Management.

The maximum amount of funding available is \$460,000.00 and the anticipated timeframe for the project is 60 months. The funds available per fiscal year are as follows:

Fiscal Year*	Dollar Amount
2017- 2018	\$130,000
2018 - 2019	\$85,000
2019 - 2020	\$90,000
2020 - 2021	\$80,000
2021 - 2022	\$75,000

*The fiscal year begins on July 1st and ends on June 30th.

Proposal Format Instructions:

I. The University is encouraged to limit the proposal to no more than 20 pages (not including resumes). The cover page should contain the contact information for an Administrative contact and the Principal Investigator.

II. Provide a Management Plan which explains the approach to project. Provide a description of the organizational structure and management to be used to provide the required services, maintain schedules, control costs and provide quality products. This shall include a discussion of the means of coordination and communication with the Department. Include a description of subcontractors and how the subcontractors will contribute to this project.

The Management Plan should explain the functions and responsibilities of each key person and their experience developing and/or conducting research to support this project. Identify the Principle Investigator who will remain involved throughout the project duration. Describe specifically how each key person will support the objectives and tasks in Exhibit "A", Scope of Services, including percent of time devoted to the project and assigned tasks. Provide the resume for each person, including subcontractors, proposed to support the project.

III. Provide a Technical Plan which demonstrates a detailed understanding of the scope, under water noise impacts on species and habitat, and knowledge of these types of data collection and analysis techniques. The Technical Plan should explain the anticipated changes to the Desired Methods described in the scope of services, and provide specific details to address deliverables for Tasks 2 through 5. The technical plan should include proposed innovative approaches. Provide a description of equipment available for use as well as any additional equipment anticipated to be purchased for the project. Discuss approach to quality control and safety.

V. The Price information shall be submitted on the form provided and detailed information provided to support the lump sum amounts identified for each deliverable. Indirect cost is limited to 10%.

Proposal Evaluation:

A Selection Committee will be established to review and evaluate each proposal submitted. The Committee will evaluate each technical proposal and assign points based on the criteria identified below. The Research Center will review the price information and assign points based on price evaluation formula.

Management Plan – 30 points as broken out below:

- Approach to project – 5 points
- Organizational Structure and Management – 5 points
- Means of Coordination and Communication – 5 points
- Identification of Key Personnel – 15 points

Technical Plan – 55 points as broken out below:

- Understanding of Scope and Understanding of underwater noise issues – 15 points
- Anticipated changes to Desired Methods – 15 points
- Approach to deliverables 2 through 5 – 10 points
- Equipment – 10 points
- Quality control and Safety – 5 points

Price – 15 points

The criteria for price evaluation shall be based upon the following formula:

$(\text{Low Price} / \text{Proposer's Price}) \times \text{Price points} = \text{Proposer's Awarded Points}$

PLEASE EMAIL PROPOSALS TO:

Katasha Cornwell in the Office of Environmental Management at katasha.cornwell@dot.state.fl.us. Include in the subject line the following information: RFRP-17/18-985-01 Underwater Noise Level Study During Impact Pile Driving

PROPOSAL ARE DUE BY 5:00 PM ON DECEMEBR 22, 2017. Proposals received after this date and time will not be accepted.

The Office of Environmental Management will notify all proposers of the final decision on January 19, 2018.

Special Notes:

Proposal will be rejected if more than one proposal is received from a University.

The Office of Environmental Management intends to award the contract to the responsible and responsive proposer whose proposal is determined to be the most advantageous to the Department.

Any questions related to this request should be directed to Katasha Cornwell at katasha.cornwell@dot.state.fl.us or (850) 414-5260.

Exhibit A – Scope of Service

Underwater Noise Level Study During Impact Pile Driving

Background Statement

In 2009 ten federal agencies, as a part of the Joint Subcommittee on Ocean Science and Technology, came together to form an interagency task force on anthropogenic sound and the marine environment. As a result of this task force, agencies agreed on high priority research recommendations to:

- Develop and validate mitigation measures to minimize demonstrated adverse effects from anthropogenic noise.
- Test/validate mitigating technologies to minimize sound output and/or explore alternatives to sound sources with adverse effects.
- Explore need for and effectiveness of time/area closures versus operational mitigation measures.

Following this interagency task force, the National Marine Fisheries Service (NMFS) began working to put into place the Ocean Noise Strategy initiative, now recognized by all of the offices within the National Oceanic & Atmospheric Administration (NOAA). The purpose of this initiative is to articulate NOAA's vision for addressing ocean noise impacts over the next 10 years and guide management actions towards that vision. In November 2016 NMFS approved the Ocean Noise Policy, which requires NMFS to work to address noise impacts to species and their habitats over the next ten years in accordance with the Ocean Noise Strategy Roadmap. With this policy, NMFS will begin to have more focus on projects with noise impacts such as those that require in-water pile driving.

In December 2016, the Federal Highway Administration assigned all federal National Environmental Policy Act (NEPA) responsibilities to the Florida Department of Transportation (FDOT). This memorandum of understanding requires the FDOT Office of Environmental Management to ensure the NEPA process is completed on all federal roadway projects statewide, including conducting species consultations as needed. During the environmental review process agency representatives from NMFS and United States Fish and Wildlife Service (USFWS) have repeatedly expressed concerns about the effects pile-driving activities have on Florida's protected species, both federally and state listed. The required species consultations are taking place project by project and do not always have a predictable outcome.

Considering the recent initiatives set forth by NOAA, these concerns are anticipated to become more frequent and have the potential to set higher standards for mitigation on transportation projects. This could potentially slow the review process, as well as delay projects by requiring the incorporation of new sound attenuation techniques. FDOT has the opportunity to be on the forefront of regulatory change and help shape mitigation techniques to the specific needs of the state of Florida because of its established agency agreements and working relationships.

Currently, the best available information the agencies use to make decisions for FDOT projects comes from the California Department of Transportation (CalTrans) “Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish”. Although the CalTrans technical guidance can provide useful background knowledge and methods, it can be improved to be more relevant to Florida projects and ecosystems. This can be done by addressing the significant differences in geology, waterway characteristics, and sediment types. These differences can cause the sound to propagate in different ways, and in turn have a varying level of impact on wildlife. These differences can also affect the noise attenuation factor, which directly correlates to the projects’ impact area and degree of mitigation deemed necessary by resource agencies.

The study proposed here provides the opportunity for the FDOT to perform the research needed to develop statewide underwater noise guidance to reflect the unique characteristics that occur within Florida’s ecosystems and to develop a statewide programmatic framework related to the characterization of underwater noise generated during pile-driving operations.

FDOT District Offices 3, 4, and 7 have conducted limited hydroacoustic data gathering, but additional questions remain. These observations were done at one bridge construction site in each district, and therefore do not provide a representative sample to be used as a statewide reference due to the small amount of data collected. Although these efforts were not comprehensive enough to provide the necessary data to develop Florida site-specific guidance, they showed the potential differences that the Florida geology and channel morphology can have on the sound levels produced by impact pile driving. For example, noise data collected in a study conducted by District 7 demonstrated the difference between the NMFS suggested noise attenuation factor of 15 and the factor calculated based on measurements taken during the study. Using the attenuation factor calculated using data from this study (as opposed to the NMFS standard), resulted in a project impact area radius of 37m, as opposed to 464 m, which was calculated using the NMFS standard. In this case, the site specific data indicated that noise attenuation was not needed. If the site-specific noise attenuation factor was not used, noise attenuation would have been required and would have resulted in unnecessary project costs.

In all three FDOT studies, noise measurements indicated that threshold levels for physiological injury were not exceeded, even in the absence of sound attenuation. This could suggest that although states like California and Washington require sound attenuation through the use of bubble curtains and cofferdams, the same sound attenuation techniques may not be necessary in Florida’s marine and riverine environments. Through the data collected within this study, it may be possible to save taxpayer dollars by avoiding unnecessary noise attenuation techniques while still insuring the safety and protection of Florida’s protected species. This would be done through analyzing the attenuation factor for all sites data is collected from and creating a reference table of attenuation factors based on key environmental and regional factors.

In summary the proposed study would enable the FDOT, in coordination with the appropriate resource agencies, to create a Florida-specific approach to ensure that in-water pile driving events never surpass injury levels to protected marine organisms, while also allowing transportation projects the flexibility needed to most efficiently and effectively meet project deadlines. By collecting data around the state that represents most construction projects and most water bodies, it may be possible to determine if and when noise reduction methods are necessary using a programmatic consultation with partner resource agencies. The FDOT will also have the unique opportunity to partner with state and federal

agencies to develop a technical guidance that can be used throughout the state to reduce overall project time and cutback on staff time used to address environmental comments concerning noise levels. The technical guidance will also offer predictability to the FDOT and the associated agencies. This study will benefit not only the FDOT in regards to bridge projects, but will also benefit Florida's taxpayers while continuing to ensure protection for our protected marine species.

Project Objectives

This projects aims to characterize underwater noise levels during impact pile driving throughout the State of Florida. The overall goal for this project is to create a programmatic approach for addressing resource agency concerns relating to noise level impacts during in-water pile driving events. The following objectives will allow for a statewide study on the impacts of pile driving on the surrounding ecosystems, while incorporating and informing all stake holder agencies. Ultimately these objectives will lead to an objective study that can be used for future decision making processes by all agencies that have an interest in in-water piling driving activities.

Objective 1:

Sample noise levels of in-water pile driving events, as well as limited drilled shaft pile installations, at pre-determined project locations throughout the State of Florida, as well as the relative noise attenuation ability of different sound attenuation techniques.

1a: Measure ambient noise levels at all sample sites to obtain baseline data.

1b: Sample a representative number of noise levels, using a standard data collection form, of all designated projects during designated pile driving activity to determine the impact area. Include noise measurements for test pile driving events

1c: Evaluate effectiveness of different types of sound attenuation methods when available; specifically bubble curtains, cofferdams, isolation casings, and preformed holes.

1d. Correlate hammer stroke height to recorded noise levels.

1e. Monitor noise levels during Test Pile installation and evaluate dynamic testing results to develop correlations between transfer energy and noise level. If the project contains less than 5 test Piles, collect the remaining data from production piles.

Objective 2:

Using the data collected through Objective 1, calculate an attenuation factor(s) based on Florida's specific marine, estuarine, and riverine environments that can be used as reference when assessing the need for noise attenuation in future bridge projects that involve pile driving.

2a: Calculate the attenuation factor for all projects monitored based on the empirical data, using the transmission loss equation (show below), and using the NMFS Impact Piling Driving Calculator.

$$F = \frac{\text{Transmission Loss (dB)}}{\log\left(\frac{D_1}{D_2}\right)}$$

F = A site specific attenuation factor

D₁ = Distance at which ambient noise levels are reached

D₂ = Distance from which transmission loss is calculated

Transmission Loss = Initial sound pressure level produced by a sound source minus the ambient sound pressure level

2b: Using the qualitative environmental data and quantitative noise data collected, determine attenuation factors best fit for different types of marine, estuarine, and riverine environments found throughout Florida.

2c: Create a programmatic method to determine attenuation factor based on site specific variables that can be used by project leads during project design.

2d: Generate a user friendly guide of attenuation factors for bodies of water throughout the State of Florida, derived from the data collected and other available data.

Objective 3:

Develop a technical guidance document and programmatic consultation biological assessment with National Marine Fisheries Service and US Fish and Wildlife, with input from stakeholders, to define and quantify underwater noise levels expected during pile driving in Florida, the potential effects on Florida marine organisms, and the best method(s) to mitigate those impacts.

3a: Form and convene a technical working group composed of government agencies and other stakeholders to review the data and results from Objectives 1 and 2.

3b: Develop a programmatic approach for the FDOT to determine the necessary noise reduction measures needed to minimize impacts to aquatic organisms using programmatic consultation with NMFS and USFWS.

3c: Refine and finalize technical guidance that explains pile driving impacts and how to mitigate for those impacts, using the agreed upon programmatic approach developed as part of Objective 3b.

Project Description

This study will utilize currently planned and/or designed bridge projects throughout the state, all within the next five-year plan. Ideally, the results of this study will yield underwater noise levels caused by pile driving that can be classified into representative environmental categories. Preliminarily, the bridge projects have been placed into regional categories. With cooperation from the FDOT Districts, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service, it was possible to create this study to be the most representative and useful to the FDOT while avoiding unnecessary costs or construction. This was done by compiling all bridge reconstruction projects within the next five years from the FDOT Districts, and consulting on appropriate methods and sampling regions with USFWS, NMFS, and experts in the field. Throughout this project the aforementioned agencies, as well as any other agencies deemed appropriate by the Project Manager, will be involved in the planning and reviewing of the data collection throughout the study. Following this study, the collaborating agencies will evaluate the possibility of using the empirical data to create a programmatic consultation biological assessment. A programmatic consultation will decrease overall time spent addressing noise mitigation comments on in-water bridge projects and give FDOT consistency and clarification on the preferred mitigation methods for such projects.

The designated bridge projects to be used for this study are shown in Figure 1, as well as described in Table 1. These projects were chosen to best reflect the variety of water bodies, ecosystems, and marine

organisms throughout the State while staying within a reasonable timeframe. Due to the scheduling and planning required for bridge projects, it will be necessary to periodically re-evaluate the desired sample sites and sample sizes of each pile type in each region. The projects described are currently in various stages of planning and implementation, so it is not yet possible to confirm the pile types and sizes, nor the environmental conditions, at each of the project sites. The FDOT uses a set of standard piles for most projects, so it is assumed the necessary variety of pile sizes and types will be adequately sampled. Project letting dates represent the anticipated start of construction, however these dates are subject to change and coordination with FDOT Districts will be required throughout the project duration to ensure schedules are current. In addition, it is possible that some bridge projects below will extend beyond the study duration.

Proposed Bridge Projects for Study

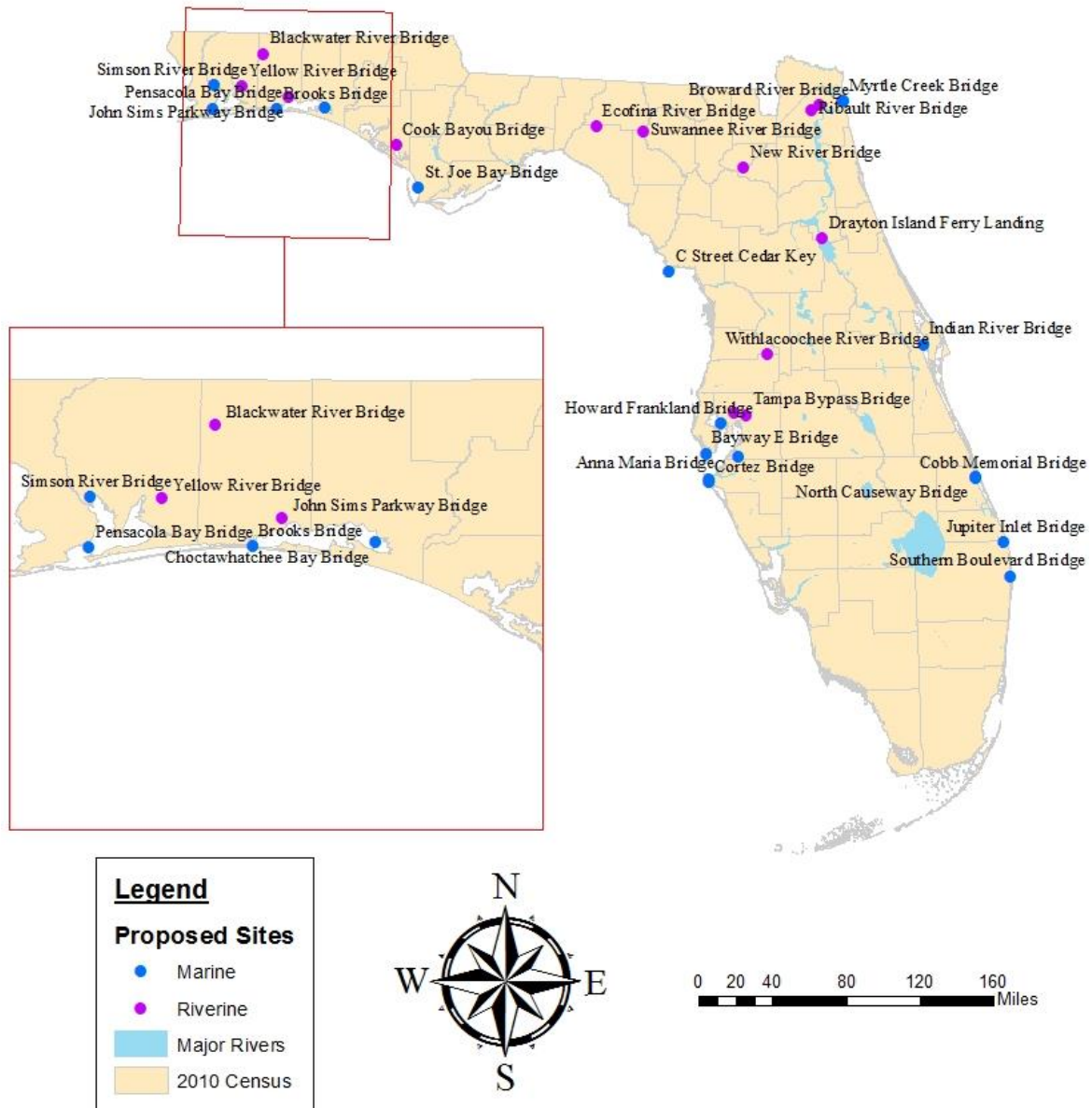


Figure 1: Map showing selected bridge reconstruction projects to be studied, and their distribution throughout the state.

Project Title	Project #	District	Letting Date	Waterbody	GPS Coordinates
Marine Ecosystems - Panhandle					
Brooks Bridge	415474-2	3	9/15/2021	Intercoastal	30°24'3.38"N, 86°36'1.52"W
Choctawhatchee Bridge		3	TBD	Choctawhatchee Bay	30°25'1.56"N, 86° 9'38.75"W
St. Joe Bay Inlet Bridge	435815-1	3	8/28/2019	St. Joe Bay/ Gulf of Mexico	29°47'54.24"N, 85°18'1.95"W
Simpson River Bridge	435816-1	3	8/26/2020	Escambia Bay	30°34'37.01"N, 87°10'55.70"W
Marine Ecosystems – Gulf of Mexico					
Cortez Bridge	430204-2	1	11/10/2022	Sarasota Bay	27°28'7.61"N, 82°41'34.72"W
Anna Maria Bridge	408185-3	1	7/12/2022	Sarasota Bay	27°29'48.00"N, 82°41'44.29"W
Manatee River Bridge	201032-5	1	7/31/2019	Manatee River	27°39'57.74"N, 82°25'58.08"W
C Street Cedar Key Channel	411423-1	2	4/24/2019	Gulf of Mexico	29° 8'6.04"N, 83° 1'53.36"W
Howard Frankland Bridge	422904-2&4	7	6/30/2020	Tampa Bay	27°55'48.16"N, 82°34'55.35"W
Bayway E Bridge	410755-1	7	TBD	Gulf of Mexico	27°41'36.44"N, 82°43'4.52"W
Marine Ecosystems – Atlantic					
Simpson Creek Bridge	434041-1	2	5/27/2020	Brackish Atlantic	30°27'47.70"N, 81°25'53.41"W
Myrtle Creek Bridge	434042-1	2	5/27/2020	Brackish Atlantic	30°27'40.76"N, 81°25'29.16"W
Southern Blvd Bridge*	419013-1	4	4/27/2016	Intercoastal	26°40'32.74"N, 80° 2'25.48"W
North Causeway Bridge	429936-2	4	4/29/2020	Intercoastal	27°28'18.68"N, 80°19'29.20"W
Jupiter Inlet	428400-2	4	8/26/2020	Atlantic	26°56'50.5"N 80°05'05.7"W
Indian River Bridge	440424-1	5	TBD	Indian River	28°31'38.7"N 80°45'22.9"W
Riverine Ecosystems					
Suwannee River Bridge	212724-2	2	5/23/2018	Suwannee River	30.244683, -83.250095
Ribault River Bridge	415250-1	2	4/25/2018	Ribault River	30.393716, -81.713381
Ecofina River Bridge	428573-1	2	12/6/2017	Ecofina River	30°17'13.5"N, 83°40'57.0"W
New River Bridge	433957-1	2	2/4/2019	New River	29°57'00.5"N, 82°20'43.3"W
Broward River Bridge	437441-1	2	3/23/2021	Broward River	30°26'14.7"N, 81°38'32.8"W
Drayton Island Ferry Landing	437418-1	2	3/18/2021	St. Johns River	29°22'56.0"N 81°38'20.9"W
Yellow River Bridge	220442-7	3	TBD	Yellow River	30°34'16.38"N, 86°55'28.62"W
John Sims Parkway Bridge	406194-3	3	5/23/2018	Toms Bayou	30°30'10.43"N, 86°29'38.66"W
Blackwater River Bridge	432828-1	3	12/5/2018	Blackwater River	30°50'0.49"N, 86°44'1.62"W
Cook Bayou Bridge	433908-1	3	TBD	Cooks Bayou	30° 8'1.20"N, 85°30'22.67"W
Withlacoochee River Bridge	435894-1	7	4/13/2018	Withlacoochee River	28°28'33.87"N, 82° 9'21.49"W
Hillsborough River Bridge	435897-1	7	4/13/2018	Hillsborough River	28° 1'13.04"N, 82°27'19.20"W
Tampa Bypass	430337-1	7	7/22/2022	Sixmile Creek	27°59'42.83"N, 82°21'4.54"W

Table 1: Description of anticipated bridge projects to be studied.

*This project is anticipated to complete construction in late 2020.

Desired Methods

Following a review of available protocols for hydroacoustic measurements, FDOT and partner agencies developed a proposed methodology for this study. The methodology establishes set distances from the pile driving event for measurements to be taken, the environmental data to be collected, and the directions of transects for each data collection event. The goal of this study is to collect objective data, not to actively monitor noise levels throughout the entire project. As a result, the project will employ a more hands-on approach than what is typically used for hydroacoustic monitoring (un-manned vessel or instrumentation recording continuously at a single fixed location).

For this more detailed study, it will be necessary to have boat-based project personnel taking measurements along a standard transect or anchoring multiple hydrophones at the desired intervals prior to the pile driving event. If a manned boat is being used, measurements should always be taken while the boat is off to avoid any additional sound within the recordings. Prior to the initiation of a pile driving event, it will be necessary to calibrate the hydrophone(s) being used. This calibration should take place at the beginning of each day of monitoring to an accuracy of ± 0.3 dB. Calibration notes, detailing the accuracy and all other settings, shall be recorded in the field data collection sheet. Calibration should be checked at the end of each day.

Ambient noise levels at a given site will be recorded continuously for an hour after the pile driving event for that day to develop a baseline for comparison against noise levels recorded during pile driving. This process will allow for an average ambient sound level to be determined at each location, as the ambient sound level can change drastically between sites for a number of reasons. The duration of recordings for all pile driving events will depend on the number of hydrophones being used and the methodology of measurement. Prior to the start of this project it will be necessary for the Project Manager to agree to the specific methodology alongside the data collection team. The agreed upon methodology will be used for the duration of the project.

For the five pile measurements at a given project location the distance between measurements are pre-determined, and will take place in 2 directions; down-current and cross-current. The designated distances at which measurements will be taken are;

- Down-current: 10m, 50m, 100m, 200m, 500m
- Cross-current: 10m, 25m, 50m, 100m, 200m.

These distances will allow for a more accurate interpolation of the distance at which the noise levels drop below the designated injury thresholds. The difference between the two different directions is to adjust for the fact that the sound will travel a further distance when going down-current, as opposed to the cross-current. The specific methods are described within the data collection sheet. If adjustments are needed to the methodology described within this scope of services, all changes must be reviewed and approved by the Project Manager prior to implementing any changes to the method. Ideally the depth of the hydrophone, as well as of the water column, will be taken with each sound recording. The ideal position of the hydrophone is dependent on the water column depth, and is described in Table 2. This method allows for a true comparison between sites and can allow for a much more accurate method of finding the impact area of any given pile driving event. There will be at least 5 pile driving events measured at a given site, unless the variation is large, double the amount of measurements will

be taken. “Large variation” will be determined jointly by the Project Manager and the data collection team.

Water Depth	Hydrophone Depth
Greater than 1m but Less than 3m	A “low depth” (within 1m from bottom)
Greater than or Equal to 3m	A mid-depth (water column divided by two = mid depth)

Table 2: Guidance for the depth of the hydrophone based on water column depth.

Aside from the hydroacoustic measurements, it will also be important to collect all possible environmental data that can be used to categorize a site. These factors include substrate type, water temperature, salinity, water velocity, wind velocity, wave height, and bathymetry if possible. Knowing these measurement will help to inform the creation of a programmatic biological consultation. The information associated with the pile being driven will also be necessary in order to categorize the data collected. This information includes:

- Model and size of hammers used
- Pile cap or cushion type and material
- Hammer energy settings and any changes to those settings during the piles being monitored
- Final tip elevation
- Total number of strikes to drive each pile that is monitored

All of the environmental, pile, and hydroacoustic data will be recorded in the field on a standard data collection sheet (see “Hydroacoustic Field Data Collection Sheet”) for each pile driving event. Any adjustments to equipment settings during data collection or any other changes should be noted within the “Note” section of the Field Data Collection Sheet. It should also be noted that within the data sheet it is necessary to use the description sections to indicate any technical aspects not already outlined. For example, under the “Sound Attenuation Type” heading if isolation casings are being used it will be necessary to indicate in the “Additional Attenuation Description” section whether they are dewatered, bubble-filled, or foam filled. Additionally when using sound attenuation it will be necessary to note the times when the attenuation method is turned on and off. This can be noted in either the “Notes” section or the “Additional Attenuation Description” section. Within the “Notes” section of the data collection sheet, any wildlife sightings or behaviors should be noted if observed. At each project location, photographs of the pile driving event and any sound attenuation methods should be taken and attached to the Field Data Collection Sheet.

Throughout the study time, it may be advantageous to reconsider project locations or to add in new project sites to give the study more detail. This could include adding sites that utilize drill-shafts to determine if the method limits the total sound exposure in a project, or including sites that utilize other types of piles than already described. With these potential additions it may also be necessary to create a new datasheet or modify the existing one to be relevant to projects not already considered here.

Coordinate with Project Manager if changing the research plan or data collection methods outlined in this Scope of Services to ensure resources are being used to gain information most useful to the Department.

Following data collection, analyses are required to obtain accurate measurements of the sound levels. These data will be analyzed with a computer that is compatible with the digital signal analyzer. Each sound recording will be analyzed to determine:

- The peak pressure, defined as the maximum absolute value of the instantaneous pressure
- The root mean squared sound pressure across 90% of the strikes energy ($RMS_{90\%}$)
- The sound exposure level, measured across 90% of the accumulated sound energy ($SEL_{90\%}$)
- The cumulative SEL (SEL_{cum}) across all of the pile strikes
- The frequency spectra, resulting in the frequency range

The results of these analyses, as well as the information collected from the field data collection, should be included in a report that can be reviewed by the FDOT, the technical working group, as well as any other decision-makers.

Hydroacoustic Field Data Collection Sheet

Project Name: _____ FDOT FM Number: _____

Project Location (GPS Coordinates): _____

Sediment Type: _____ Water Body: _____

1.) Record Pile Driving Conditions

Pile Type: ☐ Steel ☐ Concrete ☐ Sheet ☐ Other: _____

Pile Driver Type: ☐ Impact ☐ Vibratory ☐ Push-In ☐ Other: _____

Pile Description: _____

Pile Size: _____ Hammer Type: _____

Pile Driver Model: _____

Hammer Energy Settings: *attach pile driving log*
(Obtain from Project Administrator or Construction Engineering and Inspection Consultant)

Sound Attenuation Type: ☐ None ☐ Bubble Curtain ☐ Cofferdam ☐ Isolation Casing
☐ Other: _____

Additional Attenuation Description: _____

Cushion Type: ☐ None ☐ Wood ☐ Micarta ☐ Nylon
(Obtain on-site from pile driving inspector)

1.) Record Environmental Conditions

Ecosystem Type: ☐ Marine ☐ Riverine ☐ Estuarine

Water Depth: _____ Water Temperature: _____

Salinity: _____ Water Velocity: _____

Wave Height: _____ Wind Velocity: _____

Additional Environmental Description: _____

Bathymetry Available, if so Attach to Report: ☐ Yes ☐ No

2.) Equipment Settings

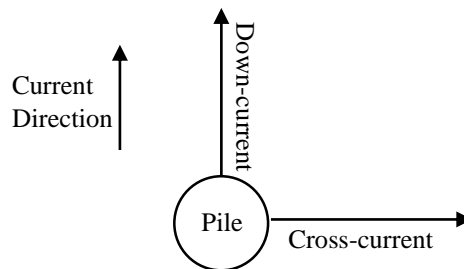
Calibration Settings: _____

Calibration Accuracy: _____

Equipment Description: _____

3.) Noise Level Data

- a. For each pile, two transects will be taken with measurements at each designated distance. One will be down-current, and the other will be cross-current, as shown below.



- b. For each project location, it is necessary to take measurements for one pile along transects at distances:
 - Down-current: 10m, 50m, 100m, 200m, 500m
 - Cross-current: 10m, 25m, 50m, 100m, 200m
- c. At each distance point, a continuous recording will be taken for the entirety of the pile driving event.
- d. Hydrophone measurements should be kept constant throughout by keeping a constant distance ratio from the bottom (i.e. mid-depth), as described in the Scope of Services.
- e. Record averages of the recording on datasheet, provided below.
- f. This process must occur for at least 5 piles at a project location. If variation within the data is large repeat this process for an additional 5 piles.

4.) Record Ambient Noise Levels

- a. Following a pile driving event in the sample location measure the ambient noise levels as close to the sample site as possible.
- b. The hydrophone depth should be kept constant throughout measurements.
- c. Measure ambient noise levels continuously for 1 hour after pile driving event.

Average Ambient: _____

Hydrophone Depth: _____

5.) Additional Field Notes

[illegible]

* Very important to synchronize watches with the pile driving inspector to try to correlate hammer stroke height (recorded by the pile driving inspector) to noise level

Supporting Tasks and Deliverables

Task No. 1: Project Kickoff Teleconference

Deliverable No. 1

The principal investigator will schedule a kickoff meeting that shall be held within the first 30 days of task work order execution. The kickoff meeting will consist of a webinar at least 30 minutes in length. The purpose of the meeting is to review the tasks, deliverables, deployment plan, timeline, and expected/anticipated project outcomes and their potential for implementation and benefits.

The principal investigator shall prepare a presentation following the template provided at http://www.fdot.gov/research/Program_Information/Research.Performance/kickoff.meeting.pdf.

The project manager, and principal investigator shall attend. Other parties may be invited, if appropriate. Submit electronic copy of the presentation to the project manager at katasha.cornwell@dot.state.fl.us.

Task No. 2: Field Data Collection

As described above, field data collection will occur throughout the state at pre-determined FDOT bridge project locations. Figure 1 provides a map of the project locations that will be used. These locations were chosen to be the most representative of different types of bridge construction projects, as well as different types of Florida marine environments, while being within the timeframe of the anticipated study duration. Throughout the study other locations may also be added if the opportunity and need arise.

The study will require ambient noise levels, as well as noise levels at pre-determined distances from the active pile-driving event, to be taken at each project location with a standard repetition. Environmental measurements, such as water temperature, salinity, substrate type, depth, etc., will also be recorded for each site to ensure characterization of the data. Some data may be available prior to field collection, and should be used whenever applicable. The field observations will be recorded using a standard data collection sheet (see attached), and then compiled into a data management system.

Deliverable No. 2a:

The principal investigator will submit recommended methods (including data sheets) based on the Desired Methods described in this Scope of Service within 30 days after the kickoff meeting for project manager review and approval. The project manager may coordinate with partner agencies on any proposed changes, but will provide comments or approval within 30 days after submittal. Should the project manager have comments, the principal investigator will respond to the comments within 15 days. The project manager will accept or reject the responses within 15 days. Once all of the project manager's comments have been addressed satisfactorily, the principle investigator is approved to move on to the next task. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Deliverable No. 2b:

(Every 6 Months): The principal investigator will submit a status report every six months documenting the field observations that have taken place thus far in the study. Specifically, the status report will include all information required within the standard data collection sheet for each pile-driving event that was recorded, as well as any other helpful images, charts, or tables. The status report will also document any issues that have occurred up to that point in the study and method to remedy the situation while still maintaining a representative and useful dataset. These status reports must be in a format that is accessible and concise that can easily be used to effectively inform decision makers of the progress of the project. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Task No. 3: Data Analyses

Alongside the field data collection, data will need to be analyzed for the RMS, Peak, SEL levels, and frequency range. At this point the attenuation factor will also be calculated based on the field data collected. The procedure to conduct these analyses is described above. These analyses should occur for each point where recordings were taken. The analyses shall take place within a week of the field observation and data collection. Using these analyses it should be possible to understand the impact each pile-driving event had on its surrounding marine environment.

Deliverable No. 3:

(Every 6 Months): The principal investigator will submit a stand-alone report that documents all analyses performed thus far in the study. The report shall contain all necessary sound measurements for each recorded data point, as well as the attenuation factor for each site. This report will also include all associated recording graphs for each measurement at each site. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Task No. 4: Stakeholder Meeting & Working Group

The principal investigator, in coordination with the project manager, will hold a Stakeholder Meeting with all stakeholder agencies (defined by the project manager) to review that data collected and its use to the FDOT and other agencies in attendance. During this meeting, principal investigator will demonstrate that all data collected was collected objectively and without bias. With the agreement of all in attendance, the data will be deemed “representative”, and can then be used to create a programmatic approach for mitigating impacts of the FDOT’s in-water pile driving events. At this meeting the need of a working group will be evaluated, depending on the results of the study.

Pending the decision of the Stakeholder Meeting and with direction from the project manager, the principal investigator will lead a working group to create programmatic biological assessment and an outline of the technical guidance to be used alongside the programmatic approach. Throughout the six months from the stakeholders meeting end date, the working group will meet a minimum of three times to create an easy-to-use matrix table identifying attenuation factors for different environment types and sound reduction methods based on pile type. During these meetings they will also develop an outline for the technical guidance that best explains the impacts of pile-driving, best management practices, and how to use the developed programmatic approach.

Deliverable No. 4a:

(Within 3 Months of Data Collection Completion): The principal investigator will provide a report from the meeting describing the discussions that took place, the decisions reached, and steps to be taken moving forward. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Deliverable No. 4b:

(Pending Results of 4a, Within 3 Months of the Stakeholder Meeting): The principal investigator will provide a programmatic biological assessment detailing the results of the working group's programmatic approach for species consultations. This report shall include an outline of the technical guidance to be developed, worksheets that can be used to determine mitigation needs, and worksheets that can be used to determine the attenuation factor of a site given certain variables. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Task No. 5: Technical Guidance Development

Deliverable No. 5:

(Within 3 Months of Receiving Deliverable No. 4b): The principal investigator will provide the FDOT OEM a digital and hard copy of a completed Technical Guidance for Mitigating Hydroacoustic Impacts on Florida Fish to be edited and revised as the Office of Environmental Management sees fit. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Task No.6: Draft Final and Closeout Teleconference

Deliverable No. 6a

Ninety (90) days prior to the end date of the task work order, the principal investigator will submit a draft final report to katasha.cornwell@dot.state.fl.us. The draft final report will contain a summary of methods and results of all tasks on the project, including any additional recommendations as a result of the study. The draft final and final reports will follow the Guidelines for University Presentation and Publication of Research available at <http://www.fdot.gov/research/docs/T2/University.Guidelines.2016.pdf>. Submit deliverable to the project manager at katasha.cornwell@dot.state.fl.us.

Deliverable No. 6b

Thirty (30) days prior to the end date of the task work order, the principal investigator will schedule a closeout teleconference. The principal investigator shall prepare a Powerpoint presentation following the template provided at [http://www.fdot.gov/research/Program Information/Research.Performance/closeout.meeting.reqs.pdf](http://www.fdot.gov/research/Program%20Information/Research.Performance/closeout.meeting.reqs.pdf). At a minimum, the principal investigator, and project manager shall attend. The purpose of the meeting is to review project performance, the deployment plan, and next steps. Submit electronic copy of the presentation to the project manager at katasha.cornwell@dot.state.fl.us.

Task No. 7: Final Report

Deliverable No. 7

Upon Department approval of the draft final report, the principal investigator will submit the Final Report electronically in both PDF and Word formats. The submittal should be labeled in a professional manner and include contract number, task work order number, project title, and date. The final report is due by the end date of the task work order and should be submitted to the project manager at katasha.cornwell@dot.state.fl.us.

Financial Consequences

Payment shall be made only after receipt and approval of goods and services. Deliverable(s) must be received and accepted in writing as specified in the task work order prior to payment. If the project manager determines that the performance of the University is unsatisfactory, the project manager shall notify the University of the deficiency to be corrected, which correction shall be made within a time-frame to be specified by the project manager. The university shall, within five days after notice from the project manager, provide the project manager with a corrective action plan describing how the university will address all issues of contract non-performance, unacceptable performance, failure to meet the minimum performance levels, deliverable deficiencies, or contract non-compliance. If the corrective action plan is unacceptable to the project manager, the university shall be assessed a non-performance retainage equivalent to 10% of the total invoice amount. The retainage shall be applied to the invoice for the then-current billing period. The retainage shall be withheld until the university resolves the deficiency. If the deficiency is subsequently resolved, the university may bill the Department for the retained amount during the next billing period. If the university is unable to resolve the deficiency, the funds retained may be forfeited at the end of the task work order period.

Minimum Performance Measures

Performance metrics are defined in this scope of work, which describes the tasks, milestones, and/or deliverables the principal investigator shall accomplish and provide under this task work order. The Research Center will conduct periodic reviews to determine compliance with the tasks, milestones, and/or deliverables.

Publication Provision

If at any time during the TWO the university desires to publish in any form any material developed under the TWO, the university must submit to the project manager at katasha.cornwell@dot.state.fl.us a written abstract and notification of intent to publish the materials and receive the project manager's concurrence to publish. Such approval to publish shall not be unreasonably withheld. If the project manager does not provide a written response within 30 days after receipt, the university may publish. The publication must include the following language:

"The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Florida Department of Transportation or the U.S. Department of Transportation."

Deliverables Schedule

Remember to include kickoff teleconference, submittal of draft final report, closeout teleconference and final report. The Research Center must at a minimum receive a deliverable every 6 months on a project.

Deliverable # / Description as provided in the scope (included associated task #)	Anticipated Date of Deliverable Submittal (month/year)	TO BE COMPLETED BY ENVIRONMENTAL MANAGEMENT OFFICE(performance monitoring)

Failure to submit deliverables in a timely manner may result in cancelation of the task work order.

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PRICE PROPOSAL

Task	Price
Task 1 Deliverable (Lump Sum Amount)	
Task 2a Deliverable (Lump Sum Amount)	
Task 2b Deliverable	
Data Collection Cost Per Site: Provide the lump sum amount for one complete field data collection event (Refer to Table 1 in Scope)	
Marine – Panhandle (Lump Sum Amount)	
Marine – Gulf of Mexico (Lump Sum Amount)	
Marine – Atlantic (Lump Sum Amount)	
Riverine (Lump Sum Amount)	
Initial Report Development (Lump Sum Amount)	
Each Subsequent 6 Month Report Update (Lump Sum Amount)	
Task 3 Deliverable	
Initial Report Development (Lump Sum Amount)	
Each Subsequent 6 Month Report Update (Lump Sum Amount)	
Task 4a Deliverable (Lump Sum Amount)	
Task 4b Deliverable (Lump Sum Amount)	
Task 5 Deliverable (Lump Sum Amount)	
Task 6a Deliverable (Lump Sum Amount)	
Task 6b Deliverable (Lump Sum Amount)	

Proposer must attach a detailed budget to support the lump sum amount identified per task. If applicable, the following information must be included.

Use of Subcontractor(s)

If a subcontractor is to work on the project, describe the work the subcontractor will perform. A scope of work and budget must be provided for the subcontractor.

Use of Graduate Student(s) and other Research Assistants

Describe the work any student(s) will perform.

Equipment

Describe the equipment available for use on the project including, but not limited to, hydrophones, sound level meters/signal analyzers, sound data software, watercraft, university vehicles for travel to bridge locations and other specialized equipment anticipated to be used for the project. Describe any additional equipment anticipated to be purchased for the project.

Florida Administrative Code states “for statewide financial reporting purposes, all tangible personal property with a value or cost of \$1,000 or more and having a projected useful life of one year or more must be capitalized. Any hardback book with a value or cost of \$25 or more and having a useful life of one year or more that is circulated to students or the general public, and any hardback book with a value or cost of \$250 or more that is not circulated must be capitalized. A review of the items on the Exception Property should be performed to ensure items to not fall within this category.

Universities must adhere to the Department’s \$1,000 threshold for equipment or items of lesser value appearing on the Exception Property listing. The university must provide a copy of the purchase invoice/property description/serial number and date of receipt for the equipment with the applicable task invoice.

A description of the equipment to be purchased must be included with a copy of the quotes obtained. Justification of specific requirements for the project and why the equipment should be purchased instead of leasing (leasing of equipment is preferred) is required for all equipment.

Expenses

Describe any expense items to be purchased, if applicable.

Travel

Describe travel that will take place, including justification of the need for travel, if applicable. Include the traveler’s name/position, location(s), purpose and duration.

If travel is budgeted, the following text must appear, as worded:

All travel shall be in accordance with Section 112.061, Florida Statutes. Bills for travel expenses specifically authorized in the agreement shall be submitted using the Department’s Travel Form No. 300-000-06, unless the university provides proof of the Department of Financial Services approval to use an alternate travel form. The Department shall not compensate the University for lodging/hotel in excess of \$150.00 per day (excluding taxes and fees).

The maximum amount of travel is limited to \$(insert amount). The maximum amount of indirect cost on travel is limited to \$(insert amount).